

HABITAT CHANGE & RESTORATION

SEA LEVEL RISE & COASTAL UPLIFT

PROJECT AT A GLANCE

Title: Assessing Coastal Uplift & Habitat Changes in a Glacially Influenced Estuary System

Place: Kachemak Bay, Alaska

Reserve: Kachemak Bay NERR

Intended Users

- ✓ City of Homer's Office of the Mayor
- ✓ Port and Harbor, and Planning and Zoning Office
- ✓ Kenai Peninsula Borough's Office of the Mayor
- ✓ Seldovia Village Tribe
- ✓ Kachemak Bay NERR Community Council
- ✓ Kenai Peninsula Coastal Management Program
- ✓ NOAA Kasitsna Bay Laboratory
- ✓ Alaska Department of Natural Resources Division of Mining, Land and Water

Project Team Partners

Kachemak Bay NERR;
University of Alaska at Fairbanks

Timeline: 9/2010 to 9/2013

Learn More

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Planning for a Changing Landscape

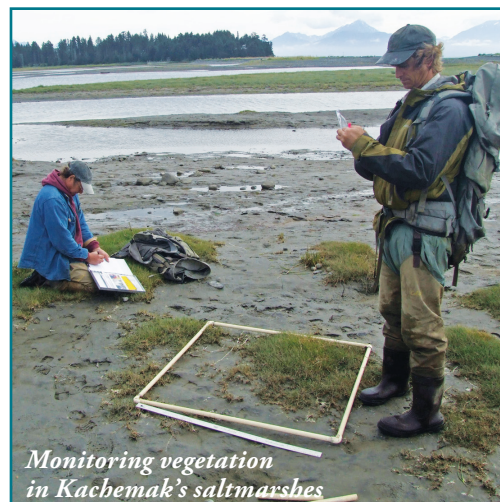
"Are we going to wash away, or are we going to have new acres of shoreline?"

That was the question that the mayor of Homer put to the Kachemak Bay National Estuarine Research Reserve (NERR) in 2009. His uncertainty, and that of other community leaders, was motivated by a series of newspaper articles about coastal uplift from melting glaciers in southeastern Alaska and personal observations of change in the coastal terrain. They had approached the Reserve in search of a way to understand what was happening in the Bay and plan for the future.

Homer is embedded in a diverse, dynamic landscape. A powerful earthquake rocked south central Alaska in 1964, and the coast is still uplifting from that event today. Ice fields in the south central and southeastern parts of the state are melting rapidly, lightening their load on the earth's surface and causing another form of uplift along the coast—isostatic rebound. Melt water from these ice fields flows into the nearshore Alaska Coastal Current, contributing to regional sea level rise.

In the balance of these conflicting forces are the communities surrounding Kachemak Bay, which depend on nearshore fisheries for food and safe harbor infrastructure for transportation.

To plan for a future in this uncertain landscape, they need to understand the implications that coastal uplift and sea level rise have for coastal erosion, infrastructure construction and protection, planning, zoning, local food resources, and public safety. A team led by the Kachemak Bay NERR is helping to meet that need by assessing the rate of vertical changes in the coastal landscape encircling Kachemak Bay and monitoring the impacts of coastal uplift, glacial melt, and sea level rise on the area's biological communities.



*Monitoring vegetation
in Kachemak's saltmarshes*

Local Context

Fifteen glaciers flow into Kachemak Bay from some of the last remaining ice fields in North America. The Bay is one of the most productive, diverse, and intensively used estuaries in Alaska. The local economy largely depends on the lucrative fishing industry and the dramatic local scenery.

Current modeling of vertical changes in the landscape suggests that the bedrock surrounding the Bay is rising faster than global sea levels. However, estimates of regional sea level rise are lacking, and many of the Bay's communities sit on land that is vulnerable to erosion and inundation. To provide local decision makers with the accurate models they need for adaptation and mitigation planning will require further measurement. Precise models of regional sea level rise and coastal uplift are also necessary to plan for changes in the local ecology.

Kachemak Bay NERR staff have been assessing changes in coastal processes such as bluff erosion, glacial extent, and salt marsh vegetation dynamics since 1999. This project builds on that work and a long history of data collection and land-level change model development by the Geophysical Institute at the University of Alaska, Fairbanks. This project is filling information gaps by characterizing large-scale changes in local ecology, landscape, and sea level rise.

SUPPORT FOR THIS PROJECT

This project was funded by the NERRS Science Collaborative.

The Science Collaborative uses a competitive process to identify and fund science to address environmental challenges in communities served by Reserves. Projects are selected through annual competitions, designed to insure that investigators, intended users of the science, and relevant stakeholders work together to describe science needs to address specific problems, define research questions, design and implement projects, and apply the results.

The program works with outreach specialists, trainers, and communicators to share information about the science that it funds with other Reserves and the broader coastal management community.

The Science Collaborative also sponsors Training for the Integration of Decision-Making and Ecosystem Science (TIDES), a UNH-based program that helps develop the skills needed to link science-based information to coastal resource management decisions. TIDES offers a non-thesis master's degree track and is developing a professional certification program.

The NERRS Science Collaborative is administered by the University of New Hampshire (UNH) through a cooperative agreement with the National Oceanic and Atmospheric Administration (NOAA).

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View of the uplifted Homer Beach floor.

Project Goal

This project team is defining the relationship between vertical landscape changes and sea level rise for the Kachemak Bay. They are documenting the rate of vertical change in multiple locations and monitoring the biological changes that result from sea level rise and fall,

reduced glacial melt water, and coastal uplift. Ultimately, they plan to provide predictive models that will generate the information that communities surrounding the Bay need to plan for mitigation and adaptation to climate change.

APPROACH

Collaborative

In 2002 the Kachemak Bay NERR established the Community Council, a group that provides an organized structure for meaningful dialogue between agencies, local governments, researchers, environmental educators, conservation groups and citizens interested in natural science research and education.

The project is using the principles of Collaborative Learning to connect investigators, the Community Council, and core intended users of the science, including representatives of the City of Homer, Kenai Peninsula Borough, Seldovia Village Tribe, Alaska Department of Natural Resources, and the NOAA Kasitsna Bay Lab.

Quarterly meetings provide a venue for the project team to share and exchange information related to data collection and analysis, the collaborative process, scientific uncertainties, the utility of the data products, and product formats with the core intended users of the science.

In the future, these meetings will provide an opportunity for the project team, the Community Council, and the public to share project progress, lessons learned, and feedback synthesized from core intended users of the science.

Geological, Biological, Educational

This project team will develop models to explain the rate of change of land levels and sea levels in the Kachemak Bay area and begin to document the effect of these changes on coastal ecosystems. Over the next three years the team will:

- Compare uplift rates on sites located on unconsolidated glacial till and bedrock;
- Monitor elevation and changes of salt marsh vegetation as an indicator of the balance between sea level rise and land level change;
- Refine models to better predict uplift rates in areas between measurement sites, calculate estimates of regional sea level rise, and assess the impacts of coastal change for coastal habitats of Kachemak Bay;
- Assess biotic diversity and community composition among salt marshes fed by different sources of water, such as groundwater, surface waters, and glacial melt;
- Educate local communities on changing landscapes through "citizen science" activities and other initiatives.